

REMARKS

Claims 1-3, 9, 26, 27 and 29 are pending. Claims 1-3, 9, 26 and 27 are herein amended. Applicants submit that the amendments do not add new material to the current Application. No amendment made is related to the statutory requirements of patentability unless expressly stated herein. No amendment made is for the purpose of narrowing the scope of any claim, unless Applicants argue herein that such amendment is made to distinguish over a particular reference or combination of references.

Claims 1-3, 9, 26, 27 are patentable under 35 U.S.C. 112, second paragraph. Although Applicants disagree that an amendment was necessary, Applicants herein amend claims 1 and 26 to change “adjacent to” to “over” or “under; whichever is appropriate based on the figures and specification, to hasten prosecution and issuance or decrease the number of issues on appeal, if taken.

Applicants herein traverse the Examiner’s rejection of claims 1-3 and 9 over Halliyal (US 6,451,641), Ballantine (US 6,444,592), or Haukka (US 2002/0115252) in view of Shinriki (US 5,292,673) under 35 U.S.C. 103(a). The Examiner contends that Shinriki’s teaching that high-k materials can be used together in layers or mixtures for a dielectric layer combined with the teachings and suggestions of Halliyal, Ballantine or Haukka of using zirconium oxide and hafnium oxide to motivate one skilled in the art to form “a layered dielectric of hafnium oxide and zirconium oxide in which hafnium oxide is adjacent to the gate electrode and zirconium oxide is adjacent to the semiconductor substrate.” This reasoning is in error and the Examiner is improperly using hindsight analysis.

Halliyal, Ballantine, and Haukka, all teach and suggest using high dielectric constant materials in combination with each other, such as hafnium oxide and zirconium oxide. However, Halliyal, Ballantine and Haukka, alone or in combination, fail to teach or suggest hafnium oxide over zirconium oxide, with which the Examiner agrees. The Examiner relies on Shinriki to teach or suggest using the materials taught and suggested in Halliyal, Ballantine and Haukka to motivate one skilled in the art to form hafnium oxide over zirconium oxide, but this is incorrect. Shinriki is cumulative to Halliyal, Ballantine and Haukka because Shinriki fails to teach or suggest any additional features not taught or suggested by Halliyal, Ballantine and Haukka. For example, Haukka in lines 13-16 of paragraph 27 teaches that high dielectric constant materials can be used in combination with each other to form a dielectric like Shinriki teaches in column 8, line 66 to column 9, lines 5. Regardless, Applicants herein will address how Shinriki fails to teach or suggest the features for which the Examiner relies upon Shinriki to teach or suggest.

Shinriki asserts that different high-k materials can be used in layers and mixtures as a gate dielectric, but is silent as to their order. The Examiner is incorrectly reading into Shinriki’s statement, alone or in combination with the other cited art, motivation to form hafnium oxide over zirconium oxide. Shinriki teaches many high-k materials in a list and fails to focus over any particular order of layers for forming the high-k materials. Thus, Shinriki is silent as to the order of different high-k materials.

In contrast, Applicants’ independent claim 1 asserts an order that is specific to the materials hafnium oxide and zirconium oxide. Such an order achieves benefits which the prior art fails to recognize. As stated on page 5, lines 24-26 of Applicants’ specification, it is preferred that hafnium oxide is over zirconium oxide so that zirconium oxide will not react with the gate material, which is usually polysilicon, and form a silicide. The prior art, alone or together, fails to recognize that zirconium oxide may undesirably form a silicide with a gate material. Since the

prior art, alone or together, is silent as to the order of the zirconium oxide and the hafnium oxide and fails to provide any suggestion or motivation to have hafnium oxide over zirconium oxide, the prior art, alone or together, fails to teach or suggest all features of independent claim 1. Thus, claims 1-3 and 9 are patentable over Halliyal, Ballantine, or Haukka in view of Shinriki under 35 U.S.C. 103(a).

Applicants respectfully submit claims 26 and 27 are patentable over Shinriki and Haukka under 35 U.S.C. 103(a). As explained above, in regards to claim 1 and its dependencies, Shinriki and Haukka fail to teach or suggest that hafnium oxide is formed over zirconium oxide, as stated in independent claim 26. Thus, for at least the reasons stated above, claims 26, 27, and 29 are patentable over Shinriki and Haukka under 35 U.S.C. 103(a).

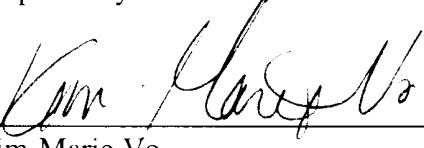
Believing to have responded to every issue raised by the Examiner in the last communication mailed, Applicants believe the present Application is currently in a condition of allowance. Applicants earnestly solicit allowance of all pending claims. Please contact the practitioner listed below if there are any issues.

Respectfully submitted,

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